LIGHTNING ON THE KITE WIRE.

In the MONTHLY WEATHER REVIEW for April it was suggested that a simple method for overcoming the difficulties incident to the destruction of the kite wire by discharges of atmospheric electricity must be found before we can trust the kites in the upper regions in the neighborhood of an area of thunderstorms. Probably the first method that occurred to Professor Marvin was to substitute silk for wire. But this is evidently expensive; and as the silk cord would necessarily be of much larger diameter than the wire, there would be a proportionate injurious wind effect, diminishing the altitude of the kite. His next suggestion was the retaining of the steel wire as a whole, but inserting an occasional stretch of 50 to 100 feet of silk cord. Now, we must recognize the fact that the electric current along the wire increases rapidly from a strength sufficient to give sparks an inch long up to the destructive lightning flash. A moderate discharge or flash destroys the continuous steel wire, but a stronger flash will jump over 50 or 100 feet of silk cord and still destroy the wire, so that the introduction of the silken loop will simply delay the destructive flash for a few minutes, and does not solve the problem of perfect safety. It was, therefore, put aside by Professor Marvin almost as soon as he suggested it to the Editor.

The same idea was subsequently suggested both by Professor Rowland, of Johns Hopkins, and our amiable colleague, Dr. J. W. Kales, of Franklinville, N. Y. The latter adds that the silk cord should be covered with insulating varnish, to protect it from moisture and rain, and he adds that—

> The trouble arises from grounding the wire, thereby making it a conductor of all the electricity in the higher air. Of course the wire must be grounded at the reel. Lightning destroyed our telephone wire when it was accidentally grounded against a dwelling house. The wire was $\frac{1}{16}$ inch in diameter and 1 mile long. The house was damaged, but not set on fire.

Professor Rowland verbally stated that at first thought he saw no way to make the kite line perfectly safe, except to make it either too poor a conductor to transmit any electricity or so good a conductor that it will transmit the entire lightning flash without becoming overheated.

As any increase in the diameter of the kite line injures its efficiency as a means of carrying our meteorological apparatus to great heights, we judge that better suggestions are still in order, and that for the present it will be best not to fly the kite when thunderstorms are approaching. On the other hand, in cases of special interest, it is allowable to fly the kite even if the line is burnt up, because we have hitherto always secured the kite and its record after a little search.

CURRENTS INDUCED BY DISTANT LIGHTNING.

In the Comptes-Rendus of the Paris Academy of Sciences of June 13, 1898, page 1743, M. Ducretet says:

> I have had occasion to register the atmospheric electric discharges into the receiver at a station for "hertzian telegraphy without wires" installed at my house. The mast rises above ground to a height of 26 meters; the ground is about 55 meters above sea level. This mast dominates the neighboring houses and can be seen from a great distance. The insulated conducting wire placed at the extremity of this mast is 32 meters long; this collector of electric waves penetrates into my laboratory and is connected with one of the electrodes of the Branly radio-conductor of the receiving station; the other electrode is put to the ground.
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> Saturday, June 11, from 2:30 to 3:40 p. m., during a thunderstorm my automatic receiver registered 311 intermittent atmospheric discharges successively as they made their presence felt upon the collector of the mast. These discharges were registered before flashes of lightning were seen or thunder heard.

We have here a phenomenon quite identical with the lightning on the kite line, as described in the MONTHLY WEATHER REVIEW for April. An insulated kite line is the conducting thread and collector of electric waves for the system of Hertzian telegraphy without telegraph lines, and in fact has already been applied for that purpose, as will be seen from the following article.

NEW USE FOR KITES—THE TELEPHONE KITE.

According to the journal Electricity some recent experiments have been made in England, in which a kite was made to support a telephone wire. Apparently the middle of the wire was fastened near the kite which was flown from a ship, as if at sea. One end of the telephone wire remained on the ship, the other was dragged by the kite a long distance to leeward until it was without difficulty dropped on the deck of H. M. S. *Dauntless*, where it was secured and attached to a telephone apparatus. In this way, vessels that are perhaps 2 miles apart can be brought into telephonic communication, and when no longer needed, the kite and telephone wire are reeled back to the first vessel without any loss. In the present case the experiment lasted four hours, during which time the kite remained suspended, held in place by the two wires and communication between the two vessels was uninterrupted.

It would seem that such a method of communicating between the shore and a vessel to windward wrecked in the breakers would sometimes be as useful as the Francis life-saving apparatus. The kite telephone, so-called, would prove especially valuable at nighttime. The same method would seem to be as practicable for carrying a telephone wire over a difficult country or forest as over the ocean, and probably as useful in war times as in time of peace.

SAFETY FUSE FOR LIGHTNING ON THE ANEMOMETER.

Mr. P. E. Doudna, voluntary observer at Colorado College, Colorado Springs, makes the following report:

> At 4:30 p. m., July 15, during a severe electrical storm, the anemometer in use here was injured by lightning. Thinking that a description of the broken instrument and an explanation of the nature of the discharge may be of interest, I submit the following:
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> A hole was torn through the glass cover and the shattered glass thrown outside of the instrument. On the opposite side the cap which closes the oil hole was thrown out, but not injured in the least. The cups and arms attached to the spindle would not turn. On removing the cap that covers the mechanism of the instrument I found that the copper wire on the inside of this cap was fused. After working the cups a few minutes they seemed to turn as smoothly as ever. I put in a new connection to supply the place of the fused wire and used an oilcloth cover instead of the glass. The instrument was then put back in its place (a position 12 feet above the roof). The self-recorder commenced immediately to give its usual record. At first I was at a loss how to account for the peculiar nature of the injury done the instrument, but it seems to me now that the lightning must have struck the wire connecting the anemometer with the register, and fusing the wire inside the cap, which fits quite snugly and has only one small opening, created a force through the sudden expansion of the air inside the cap sufficient to shiver the glass cover of the cap, to throw the oil cap out, and to force the spindle carrying the cups so tightly into its bearings as to prevent rotation.
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> The record which the instrument made just before the accident shows that the wind was blowing 12 miles per hour. The wire was fused just as the connection was made on a tenth mile, and instead of the customary long offset there is only a very thin line extending slightly farther out from the base line than the others.

In this connection Professor Marvin notes that the small wire that was fused is finer than the wire in the coils of the electro-magnet; it therefore melted before a sufficient current passed through to injure the coil of the magnet, and has, therefore, served as a safety fuse for the anemometer. The fact that the spindle stuck in its bearings seems to indicate that it needed oil rather than that it was the direct effect of lightning.

WHICH TREES ATTRACT LIGHTNING?

In a letter to the Chief of the Weather Bureau, Mr. Alexander McAdie, local forecast official at San Francisco, lately urged